A note on models: The Petrel, Petrel 2, and Perdix share a common firmware base. Due to hardware differences not all features are available on all models. The following changes apply to all models unless otherwise noted.

Version 38 (2016-09-26):

> **FIX:** Fixed a problem where under certain conditions a value between 0 to 5 minutes could be added to the surface interval time after a turn off then turn on cycle.
>
> **FIX:** Changed the compass heading mark colour back to green (instead of white).

Previous Release Notes

Version 37 (2016-06-20):

FIX: Corrected the ascent rate arrows display. In v34 the dark gray was incorrect, making the display appear to always be full.

FIX (Petrel 1 model only): Now able to add the Δ+5 to the configurable center row locations. This was mistakenly omitted from v34 on the Petrel 1 model only.

FIX (Petrel 2 analog PPO2 models only): Added ability to correct an O2 offset problem that affected Petrel 2 analog PPO2 monitoring models (e.g. the Petrel 2 Fischer) that shipped from the factory with firmware v29 installed. Please see the notice at www.shearwater.com for more details. DiveCAN rebreather controller models were not affected by this issue.

Note: v35 and v36 were not publically released.

Version 34 (2016-05-04):

CHANGE: The 'OC/CC' mode has been renamed to 'CC/BO', where BO means bailout.

Purpose is to clarify that OC/CC mode was never intended to be used for purely OC dives. Using the OC/CC mode for OC dives results in sub-optimal operation. This change clarifies the CC/BO mode is for closed circuit dives, with open circuit bailout.

When diving OC, the mode should be set to either "OC Tec" or "OC Rec".
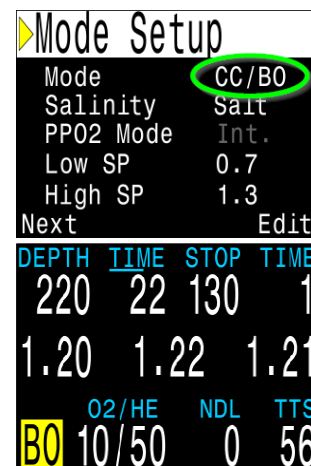
"OC/CC" mode renamed to "CC/BO" for clarity of purpose

Add a custom startup image to the Perdix

NEW FEATURE (Perdix only): A custom image can be used as the Perdix startup splash screen. The size image size must be 320x240 pixels. Shearwater Desktop version 2.5.4 or higher is required to upload images.

IMPROVEMENT: Better dive log page navigation. Allows moving backwards and forwards through the pages of dive logs (previously could only move forward or exit).

NEW FEATURE: The gas will display in flashing red when its PPO2 is outside of a safe breathing range (i.e. below the min PPO2 or above the max PPO2 setting).

In CC mode, this warning refers to the diluent only. The breathing loop PPO2 may be in a safe range, but if the diluent is unsafe to breathe directly then the gas will be red. Note that other warnings exist to warn when the breathing loop is outside of a safe range.

The CC diluent is red to indicate it is unsafe to breathe directly (PPO2 > 1.60)

NEW FEATURE: Units of depth and temperature can be set independently. Depth can be set to feet or meters. Temperature can be set to °F or °C.

NEW FEATURE: Δ+5 (Delta + 5 minutes) is added as an option on the configurable center row, configurable bottom row, and 'NDL display' replacement. Δ+5 is the difference in the time-to-surface (TTS) if you remain at the current depth for 5 more minutes. This value can be positive or negative. For example, a Δ+5 of +10 would mean that staying 5 more minutes at the current depth would result in 10 more minutes of decompression stops.

Δ+5 is similar to @+5, but the @+5 value shows the entire TTS while the Δ+5 only shows the difference from the current TTS.

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CHANGE: When editing the dive number for the next recorded dive, the menu is now named "Next Log=" and you enter the value for the next dive. Previously you would enter the number of the last dive and the next dive would be this value plus one. The new method is more intuitive and is better described by the menu name.

IMPROVEMENT: Added a method to recover deleted dive logs. In the 'Dive Log' menu, there is now a 'Restore Mode' option. Setting this to "ON" allows either a "Restore All Logs" option or restoring individual logs (View the log list, deleted logs will be grayed out. Enter into the log view then the edit page will have an undelete option). After the unit is turned off then back on, this option will be reset to "OFF".

CHANGE: When viewing the "TISSUES" bar graph, the display will not timeout back to the main screen.

FIX: Corrected the issue which the dive log was not shown properly when screen is flipped. This bug only affected the Perdix model.
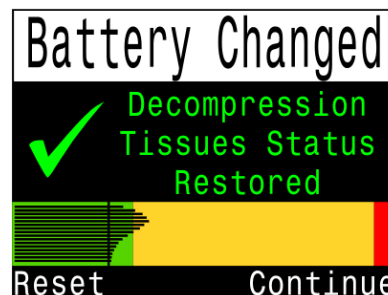
Version 33 (2016-01-15):

Firmware v33 was the first public release for the Perdix. Perdix firmware is identical to Petrel 2 firmware, with the exception of an updated display driver for the new display in the Perdix. Improvements to the compass only apply to the Petrel 2 and Perdix models.

NEW FEATURE: After changing the battery, the current deco tissue loading is shown on the Tissues Restored screen.
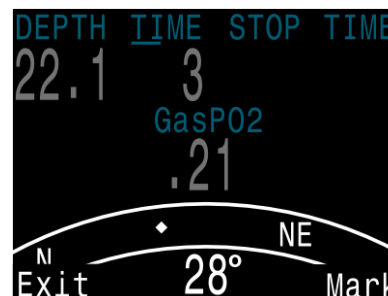
NEW FEATURE: On the Tissues Restored screen, a shortcut to reset the tissues is given. If Reset is chosen, a prompt will be displayed to confirm.
Do NOT reset tissues between repetitive dives, as inert gas loading will be lost.

The tissues bar graph is now shown on the Tissues Restored screen

CHANGE: Compass mark heading menu moved to reduce button presses. Also, the compass can now be viewed while marking. Operation: when viewing compass a left button press brings up an "Exit   Mark" menu. Right press marks compass, Left press exits to main screen. Previously had to navigate to regular

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menus to mark the compass.

IMPROVEMENT: When a heading is marked, the display now shows the offset angle between the current heading and the marked heading. This is useful for navigating patterns. For example, a box pattern requires turns at 90° intervals, while a triangle pattern requires turns at 120° intervals.

The mark heading command now requires less button presses

The offset between current and marked heading is now shown (in this example 16°)

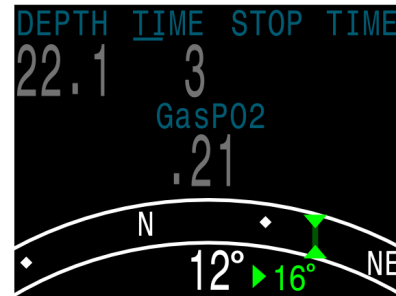**IMPROVEMENT:** Compass display improvement. The 'N', 'E', 'S', and 'W' characters changed to a larger font.

NEW FEATURE: New "Cave" brightness setting. This is even dimmer than Low brightness, and is suitable for very dark environments like caves.

Cave brightness is very dim and thus best suited for dark environments like caves

NEW FEATURE (DiveCAN Models Only): Added support for changing settings on peripheral boards.

For example, on the SOLO board (solenoid and oxygen controller) the Solenoid Speed setting can be adjusted. Go to "Bus Devices" page on Petrel to access peripheral boards. Settings viewed here are stored on the peripheral device.

Firmware updates on peripheral boards may be required before settings can be adjusted.

On the "Bus Devices" page, choose "View" to see more info and settings
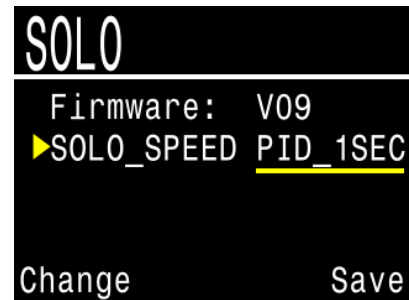
If settings are available, they can be changed here. These settings are stored on the peripheral device.

BUG FIX: Fixed problem where gas usage for bottom time segment in dive planner was too low, due to the ascent rate (33 fpm) being used to calculate descent (60 fpm). Only affected gas usage calculations and not the decompression schedule.

NEW FEATURE: For Perdix, backup the deco tissues and clock into permanent memory every 16 seconds when on (every 5 minutes when off). Reason is to restore to these values after battery change, since Perdix does not have super-capacitor. Also, the Petrel will use these backups if the super-capacitor gets drained.

NEW FEATURE: Added support for Perdix hardware and new display driver for Perdix.

Version 29 (2015-06-26):

NOTE: After upgrading to v29, it is not possible to downgrade to earlier versions.

Petrel 2 only:

- **NEW FEATURE:** Added a mini compass as an optional display on the center row.

- **NEW FEATURE:** The current compass numerical value (azimuth) is shown on the "Mark Heading" menu.

- **CHANGE:** After marking a heading, if the new mini-compass is shown, returns to the main screen. If mini compass is not shown, returns to the compass screen as before.

All Models:

- **NEW FEATURE:** Timer (stopwatch) display added as an option on the configurable center row or configurable bottom row.

- **IMPROVEMENT:** More robust method of storing settings to better protect against transient conditions when a battery dies inside unit to prevent corruption of data.

- **CHANGE:** Automatically turns on the unit when the absolute ambient pressure is greater than 1100 mbar (previously was 1300 mbar). Result is faster auto-on when dive starts with Petrel turned-off. As a reminder, this auto-on feature is designed as a backup. We always recommend turning your Petrel on before a dive starts to confirm functionality and setup.

Important Notice – Change to surface pressure determination

- **IMPROVEMENT:** Improvements have been made to ensure the surface pressure (i.e. the atmospheric air pressure) determination is more reliable for divers at high altitudes, regardless of how the Petrel is turned on.

  The surface pressure is now determined by the following:
  - When in sleep mode (off), the pressure is sampled every 15 seconds.
  - The last 10 minutes of pressure samples are saved.
  - Upon turn-on (regardless of the cause), the minimum pressure from the 10 minute pressure history is set as the surface pressure.
  - The exception is when the battery is changed, since there is no 10 minute history. In this case it is assumed that the unit is on the surface, so the current pressure is used as the surface pressure.

- **CHANGE:** When on surface and not wet, the no-activity shutdown timeout has increased from 15 minutes to 30 minutes (although DiveCAN controller models still have 45 minute timeout).

- **CHANGE:** In OC Rec (Nitrox) mode, a fixed value of 0.16 is now used for the low ppo2 warning. This change is to prevent low PPO2 warnings when diving at altitude (previously used 0.19). Note that O2 % cannot be set lower than 21% anyways when in OC Rec mode.

- **FIX:** Fixed wrong CNS calculation in Dive Planner during diving.

- **FIX:** Fixed wrong CNS and gas usage calculation in Dive Planner after the Salinity is changed.

- **FIX:** Fix to Dive Planner where in certain dives ascent to first stop takes place in one minute rather than actual expected time.

- **FIX:** Fixed some VPM-B dives are more conservative issue.

- **IMPROVEMENT:** Better compatibility with some Android devices when uploading logs via Bluetooth.

- **IMPROVEMENT:** Now can display dive time more than 999 minutes (16h40m). When dive time exceeds 999 minutes, shows as XXhXXm, up to 99h99m. However, a smaller font must be used to fit the time in the hours and minutes format.

- **IMPROVEMENT:** Display one decimal place for max and average depth when using meters.

- **IMPROVEMENT:** For 3.6V saft battery type, improved compensation for temperature and current draw for more accurate battery gauge and warning levels.

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- **CHANGE:** Added limitation that PPO2 calibration cannot be performed when pressure is above 1080 mbar.

DiveCAN Controller Models:

Important Notice – Change to auto setpoint switching

- **CHANGE:** Changes to auto setpoint switch behaviour. The reasons for these changes are:
  - o Allows each setpoint switch to occur more than once per dive, but under more controlled circumstances.
  - o More intuitive behaviour.
  - o Fights less with manual setpoint switches.

  The changes are:
  - o The switch down depth is now enforced to be less than the switch up depth, by at least 20ft (6m).
  - o The minimum switch down depth is 5ft (2m). Thus, the minimum switch up depth is 25ft (8m).
  - o Each auto setpoint switch can now occur as many times per dive as the switch depth is crossed. The 20ft (6m) enforced gap between the up and down depths prevents oscillations.
  - o A switch up will only occur while *descending* (going deeper) across the switch up depth.
  - o A switch down will only occur while *ascending* (going shallower) across the switch down depth.
  - o If a manual setpoint switch occurs, the auto switch will be cancelled if within 6ft (2m) of the auto switch depth.

  Previously, each auto switch direction could only occur once per dive. Also, previously the auto setpoint switches could fight with manual switches under certain conditions, requiring the manual switch to be performed twice. This fighting could also lead to the one auto switch being inadvertently consumed, which could cause confusion later in the dive when the auto switch would not occur as expected.

- **CHANGE:** For DiveCAN controller models, reduced sensitivity of wet contacts to prevent accidental turn-on.

- **FIX:** Fixed DiveCAN doesn't log PPO2 source when bailing out to OC.

rEvo rMS Model:

- **FIX:** Fixed an rMS roll-under bug that could occur if rMS system lost connection with probes during dive and was operating in the countdown mode.

- **CHANGE:** If an rMS probe fails its power-up test (i.e. "TEMP PROBE FAIL" message), then the entire rMS system is locked out and does not provide information. Petrel must be turned off and back on to clear this state.

Version 28 (2014-12-10):

All Models:

BUG FIX: Fixed a bug in the Dive Planner where under some circumstances an ascent leg would incorrectly labeled as a descent leg and given zero time duration. This would lead to incorrect gas usage calculations for this leg, as well as the run time being short by the time it would take for this ascent leg. Note that this affected the dive planner, and not the real-time decompression calculations. This fix is the only change for version 28.

Version 27 (2014-11-19):

Petrel 2 Only:

- **NEW FEATURE:** Tilt compensated digital compass. Accessed by pressing the right button once.

- **NEW FEATURE:** Bluetooth Smart Ready for Apple iOS device support. The Bluetooth Smart Ready module supports both Bluetooth Classic (v2.1) standard and the new low energy Bluetooth Smart (v4.0) standard.

All Models:

- **NEW FEATURE:** A plot of the dive temperature is now shown in the dive log view. Also shows minimum, maximum, and average temperature for the dive. Accessed after the dive log graph.

- **NEW FEATURE:** Additional information can now be viewed in the dive log view. Accessed after the temperature graph (see above). Includes:
  o Mode (OC Tec, OC Rec, OC/CC, Gauge, etc)
  o Surface Interval
  o Surface pressure in millibar
  o Deco model and conservatism
  o Start CNS %
  o End CNS %
- **CHANGE:** When surface pressure is less than 960 millibar, now forces the use of auto altitude setting (i.e. cannot use the SeaLvl setting). This does not change the saved setting.

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- **CHANGE:** The dive planner now inserts ascent legs in the results table to perform gas switches during the initial ascent to the first deco stop. The decompression calculations always included these switches, but the planner results were only showing a single ascent to the first deco stop using the bottom gas. This change results in more accurate gas usage results for some dives.

EXT (Fischer connector) Model:

- **NEW FEATURE:** External PPO2 monitoring is now supported for 2 sensors (previously only allowed 1 or 3 sensors).

NOTE: Versions v23 to v26 were not publically released

Version 22 (2014-10-10):

- Chinese language version of v21.

Version 21 (2014-09-19):

DiveCAN Rebreather Controller Models

- **CHANGE:** Removed auto-promotion of setpoint from 0.19 to low setpoint when wet.
  Reminder that the 0.19 setpoint is <u>not</u> intended for use <u>when breathing on the loop</u>. The 0.19 setpoint is a convenience feature for use when setting up and storing the rebreather only.

EXT Model

- **CHANGE:** When the "Cal FO2" setting is changed, no longer deletes the existing calibration data to force a new calibration.

All Models

- **CHANGE:** No longer suggests a better gas (by changing displayed gas color to yellow) if the O2 content is the same (this can only happen if O2 content is the same, but Helium content is different). Not a typical situation, but encountered occasionally by divers, who found the better gas suggestions confusing.
- **FIX:** When switching to/from OC Rec mode, now immediately updates the 'Altitude' setting (in OC Rec mode this setting can only be set to 'Auto'). Previously this change would occur after the next on/off cycle following the mode change.
- **FIX:** For the 1.5V Photo Lithium battery type, fixes an issue where the battery bar graph always

showed 100%. The low battery warnings and color coded alerts were correct however.

- **FIX:** Fixed a problem that could cause "Watchdog Reset" when the battery is changed, especially when battery removed for a few hours.

Version 20 (2014-07-25):

Standalone and EXT Models

- **NEW FEATURE:** Chinese language translation. Produced as separate build. Contact Shearwater or Chinese dealers for more information.

NOTE: Firmware version v19 was not publicly released.

Version 18 (2014-03-23):

All Models

- **NEW FEATURE:** Dive log parameters can now be edited. To access, press right button while viewing the dive log graph. Allows editing of:
    - Dive #
    - Dive start time and date
    - Delete dive
- **NEW FEATURE:** Added Clear Log menu option to clear all dives. When dives are deleted, doesn't actually delete data, but flags logs so they do not display on Petrel or desktop software. However, logs can still be undeleted or downloaded with special commands. Reason for the ability to recover logs is in the case of a diving accident, where logs have been accidentally or maliciously deleted.
- **NEW FEATURE**: Green can be set as the main color instead of white. Set in Adv. Config. 1 menu.
- **NEW FEATURE:** Added commands for setting and getting time over Bluetooth.
- **IMPROVEMENT:** For 1.5V lithium battery type, added temperature compensation for more accurate battery gauge and warning levels.
- **IMPROVEMENT:** Changed VPM-B convergence criteria to handle corner cases better.
- **IMPROVEMENT:** When using external PPO2 monitoring and voting has failed (i.e. no consensus between cells), the CNS is now calculated off the highest PPO2 measurement. Previously used the lowest measurement. Deco calculations continue to use the lowest PPO2 measurement. This is the most conservative approach for both deco and CNS.
- **IMPROVEMENT:** In "Adv. Config.->System Info" now shows the total lifetime dive count and dive time (in hours and minutes).
- **IMPROVEMENT:** For long operations that lock-up the user interface (for example, drawing a

dive log graph or auto-calibration), now clears the button press queue when operation completes. Previous behavior was that after the long operation all queued button presses executed, which could perform random and unintended operations.

- **CHANGE:** 24-hour times are now displayed with leading 0 when hours less than 10.

- **CHANGE:** Subtracts temperature offset due to self-heating of electronics for better measure of actual water temperature.

- **CHANGE:** Shearwater logo updated to reflect new re-branding.

- **FIX:** Improvements to GF and VPM-B NDL calculations for more accurate NDL times. Most dives unaffected, but improvements can be few minutes more accurate in extreme cases especially during ascents when NDL has dropped to below 2 or 3 minutes.

- **FIX:** In VPM-B, if a better gas was available, but user remained on a different gas, then when approaching a stop, the deco calculations would switch back and forth between using the better gas and using the current gas depending on slight changes to depth. Proper behavior is to assume user will select the better gas, and always use that for deco calculations.

- **FIX:** Better healing of triplicate setting storage in case of third copy being corrupted (third copy getting wasn't healed properly if it was corrupted).

- **FIX:** If the dive is interrupted (for example, battery dies), now ensures that the dive log is properly closed so that dive appear in the dive log list and it can be downloaded.

Standalone and EXT Models

- **NEW FEATURE:** Recreational Nitrox Mode. An open-circuit only, 3 gas Nitrox mode. With simpler main screen, optional safety stops, and a configurable bottom row. Also adds a NDL planner, gas MOD warnings, N2 bar graph, and simpler settings.

- **NEW FEATURE:** Added temperature display as option on configurable center row.

- **IMPROVEMENT:** Gauge mode metric depth display now uses larger font for tenths digit.

EXT Model

- **NEW FEATURE:** PPO2 Mode. Non-deco mode like Gauge Mode, but with PPO2 display from external O2 cells. With stopwatch and resettable average depth.

DiveCAN Controller Models

- **NEW FEATURE:** Petrel DiveCAN Controller can now be plugged into the OBOE to calibrate at high altitude or for O2% other than 100%.

- **IMPROVEMENT:** For models that use PPO2 auto-calibration, now displays live updates of both mV and PPO2 from previous calibration **(Requires SOLO firmware v05 or higher).** A countdown bar is also displayed to indicate that something is happening and total timeout period.

- **IMPROVEMENT:** Appearance of the PPO2 Calibration Results screen improved.

- **CHANGE:** When on surface and not wet, the no-activity shutdown timeout increased from 15 minutes to 45 minutes (non-controller models still have 15 minute timeout).

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- **CHANGE:** When bailing out to OC, automatically switch to low setpoint (to make buoyancy control easier).
- **CHANGE:** If setpoint is 0.19, and wet contacts detect water, then promote setpoint to low setpoint.
- **CHANGE:** When setpoint is 0.19, center row displays yellow warning "SetP = .19" above the PPO2 readings.

  Reminder that the 0.19 setpoint is not intended for use when breathing on the loop. The 0.19 setpoint is a convenience feature for use when setting up and storing the rebreather only.
- **CHANGE:** The "System Setup->Dive Setup" menu page now shows "Mode" (fixed at OC/CC) and "PPO2 Mode" (fixed at Ext.). These values appear grayed-out and can't be edited.
- **CHANGE:** In Adv. Config. 2, the CC PPO2 warning limits are now more restricted. CC Min PPO2 low bound is now 0.4. CC Max PPO2 high bound is now 1.6.

rEvo rMS Model (changes in DiveCAN Controller Model section also applies)

- **IMPROVEMENT:** Petrel now transmits scrubber times on DiveCAN bus, so they get recorded in the DiveCAN log.
- **CHANGE:** Startup logo now includes "rMS".
- **CHANGE:** Removed "Force Ready" and "Scrubber Reset" menu items.

Version 12 (2013-09-19):

- Public release. Recommended for all users of previous firmware versions.
- **CHANGE:** No longer updates average depth when depth is less than 0.9m (3ft). This removes the post-dive surface interval from the average depth.
- **CHANGE:** Improvements to Bluetooth driver.
- **FIX:** Fixed problem where if Petrel was powered off for more than 15 minutes prior to a battery change, the tissues were being cleared even if successfully restored.
- **FIX:** Fixed 1.5V Photo Lithium battery warning levels. Previously went to critical (red) too soon.

Version 11 (2012-12-19):

- Public release. Recommended for all users of previous firmware versions.

- **NEW FEATURE:** Added support for Petrel EXT (external PPO2 monitoring with Fischer connector).

- **NEW FEATURE:** User configurable center row displays (Max depth, avg depth, CNS, DET, etc). Not available in all modes.

- **NEW FEATURE:** Dive End Time (DET) time. The time of day when the dive will end. For example, if the current time is 2:45pm and the current TTS is 45 minutes, then the DET is 3:30pm. Only available on the new configurable center row display positions.

- **NEW FEATURE:** Dive log downloading now allows individual logs to be selected for download. The entire dive log memory can now be downloaded (previous versions only downloaded the last 20 hours of diving).

- **CHANGE:** Adjusted low battery levels for 1.5V Photo Lithium battery type.

- **CHANGE:** Added compression to dive logs for faster downloading.

- **FIX:** Fixed issue where the new values for max and avg depth of the previous dive were not saved to permanent memory when units (feet/meters) were changed.

- **FIX:** Fixed issue where shallow repetitive VPM-B dives (less than 12m/40ft) were too conservative.

- **FIX:** Improved accuracy of Buhlmann GF NDL times.

- **NOTE:** Versions V08, V09 and V10 were internal releases only

Version 07 (2012-10-29):

- Public release. Recommended for all users of previous firmware versions.

- **CHANGE:** Changed some VPM-B calculations to improve NDL time accuracy.

- **CHANGE:** Improved internal storage of settings.

Version 06 (2012-09-28):

- Internal release. Not a public release.

- **CHANGE:** Added a hard time limit of 15 minutes that the battery can be removed until the deco tissues are reset. Previously tissues would be retained as long as super-capacitor able to keep the clocking running. However, 15 minutes is ample time for battery change, and a hard 15 minute time limit adds consistency.

Version 05 (2012-09-25):

- Internal release. Not a public release.

- **NEW FEATURE:** Added new style of Gas Select and Define Gas menus. The old style (classic) still available. Switch between styles in Adv Config 1 menu.

- **CHANGE:** Color of turned-off gases is now magenta (purple). The dark gray was more intuitive, but unfortunately was too hard to read in some lighting conditions.

- **CHANGE:** Default Title Color changed from blue to cyan. Note that title color can still be customized in the Adv Config 1 menu.

- **NEW FEATURE:** Battery info screen added to Advanced Config. Includes battery type, current battery voltage, time on since last change, and date of last change.

- **FIX:** Changed so a gas that is set to 00/00 cannot be selected as the active gas. The only way for this bug to occur was to have a zeroed gas turned on, and then turn the active gas off in the System Setup menu. Also, zeroed gases can no longer be turned on.

- **FIX:** Fixed bug entering time when AM.

Version 04 (2012-09-05):

- Public release.

- **CHANGE:** Button label font color now white.

- **CHANGE:** Changed Bluetooth Class of Device from 0 to 0x80704 (Wearable Wrist Watch with Capturing Service). This change to allow Bluetooth connections to older Android phones that have a bug in their Bluetooth stack.

- **CHANGE:** Internal change to how serial number is generated. No external effect.

Version 03 (2012-08-30):

- First public release to customers.

- **FIX:** Fixed problem where Missed Deco Stop error would be generated if last deco stop cleared while diver slightly shallower than last stop.

Version 02 (2012-08-30):

- **CHANGE:** Added additional checking on stored settings.

Version 01 (2012-08-29):

- First release to production.